

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

IRRIGATION CANAL OR LATERAL

(Ft.)

CODE 320

DEFINITION

A permanent irrigation canal or lateral constructed to convey water from the source of supply to one or more farms.

PURPOSE

To convey irrigation water from a source of supply to the beginning of a farm irrigation system. The conservation objectives are to prevent erosion or degradation of water quality or damage to land, to make possible proper water use, and to convey water efficiently to minimize conveyance losses.

CONDITIONS WHERE PRACTICE APPLIES

All canals and laterals and related structures shall be an integral part of an irrigation water conveyance system that has been designed to facilitate the conservation use of soil and water resources on a farm or group of farms.

This standard applies to channels and elevated canals but not to irrigation field ditches.

Canals and laterals shall be located where they will not be susceptible to damage from side drainage flooding, or as a minimum, they must be protected from damage by storm runoff from a 10-year, 24-hour frequency storm. Water quality, supply, and delivery for the area served shall be adequate to make irrigation practical for the crops to be grown and the irrigation water application methods to be used.

Unlined canals and laterals shall not be constructed on sites where permeability of the soils is rapid or very rapid (greater than 1.5 inch per hour). If an excessively permeable soil site must be crossed, the canals and laterals shall

be lined according to the standards for ditches and canal linings.

CRITERIA

General Criteria Applicable to All Purposes

Laws, rules, and regulations. This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Capacity requirements. The capacity of canals or laterals serving a farm or group of farms shall be determined by considering the delivery demands of all the farm irrigation systems served and the amount of water needed to cover the estimated conveyance losses in the canal or lateral. Capacity must be enough to handle any surface runoff that is to enter the canal unless emergency spillways are provided to safely release the excess surface runoff.

Velocities. Canals and laterals shall be designed to develop velocities that are non-erosive for the soil materials through which the canal or lateral passes. Local information on the velocity limits for specific soils shall be used if available. When such information is not available, the maximum design velocities shall not exceed those shown in Figure 6-2 of Chapter 6 of Technical Release No. 25 or Table 14-3 in Chapter 14 of the National Engineering Handbook Part 650, Engineering Field Handbook.

Canals and laterals must be designed with enough capacity to carry the required flows at the velocities that will be developed under the

maximum probable retardance conditions.

For capacity design, Manning's equation roughness coefficient "n" value shall be selected according to the material in which the canal or lateral is constructed, the alignment, and the hydraulic radius. The probability of additional retardance because of weeds or moss shall also be considered.

For checking designs to see that velocities do not exceed permissible values, a Manning's "n" value no greater than 0.025 shall be used and applicable criteria in Conservation Practice Standard 582, Open Channel, shall be followed.

Freeboard. Freeboard is the height of canal or lateral banks above the maximum water surface elevation that can be expected under the most severe design operating conditions. The required freeboard shall be at least 1/3 of the design flow depth (0.33d) and shall not be less than 0.5 foot.

Side slopes. Canals and laterals shall be designed to have stable side slopes. Local information on side slope limits for specific soils and/or geologic materials shall be used if available. If such information is not available, the design side slopes in the canal or lateral shall not be steeper than the following:

Material	Side Slope
Solid rock, cut section	¼:1
Loose rock or cemented gravel, cut section	¾:1
Heavy clay, cut section	1:1
Heavy clay, fill section	2:1
Sand or silt with clay binder, cut or fill section	1½:1

Water surface elevations. Water surface elevations shall be designed to provide enough hydraulic head for successful operation of all ditches or other water conveyance structures diverting from the canal or lateral.

Canal or lateral banks. The top width of canal or lateral banks shall be enough to ensure stability, prevent excessive seepage, and facilitate maintenance. It shall not be less than 2 feet and shall equal or exceed the flow depth.

Maintenance access. Maintenance access, as specified in the Conservation Practice Standard 582, Open Channel, shall be provided along one or both sides of a canal or lateral, as required,

for maintenance operations. If the top of the bank or berm is to be used for a roadway, the width shall be enough for that purpose.

Protection from surface waters. Runoff from adjacent areas shall be conveyed over or under the canal or diverted away from the canal or disposal systems provided. These facilities should handle a 10-year, 24-hour storm frequency. If runoff is permitted to enter the canal or lateral, the side slopes shall be protected from erosion; and provisions shall be made for the disposal of this runoff.

Related structures. Plans for canal or lateral installations shall provide for adequate turnouts, checks, crossings, and other related structures needed for successful operation as a conservation irrigation facility. All related structures shall be designed and installed to meet conservation practice standards. Structures needed for the prevention or control of erosion shall be installed before the canal or lateral is put into operation.

Vegetation. All excavated areas and side slopes of the embankment shall be seeded. Seedbed preparation, seeding, fertilizing, and mulching shall comply with Conservation Practice Standard 342, Critical Area Planting.

CONSIDERATIONS

Water quantity. Consider the following:

- Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge
- Potential for a change in plant growth and transpiration because of changes in the volume or level of soil water
- Effects on downstream flows or aquifers that would affect other water uses or users
- Effect on the water table of the field in providing suitable rooting depth for anticipated land uses

Water quality. Consider the following:

- Effects on erosion of banks and beds and the movement of sediment and the soluble and sediment-attached substances carried by runoff

- Effects on the movement of dissolved substances to ground water
- Short-term and construction-related effects on the quality of downstream water courses
- Potential for uncovering or redistributing toxic material
- Effects on wetlands or water-related wildlife habitats
- Effects on the visual quality of water resources
- Effects of water levels on salinity of soils, soil water, or downstream waters

PLANS AND SPECIFICATIONS

Plans and specifications for constructing irrigation canals or laterals shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed and reviewed with the landowner or individual responsible for operation and maintenance. The plan shall adequately guide in the routine maintenance and operational needs of the irrigation canal or lateral. The plan shall also include guidance on periodic inspections and post-storm inspections to detect and minimize damage to the practice.